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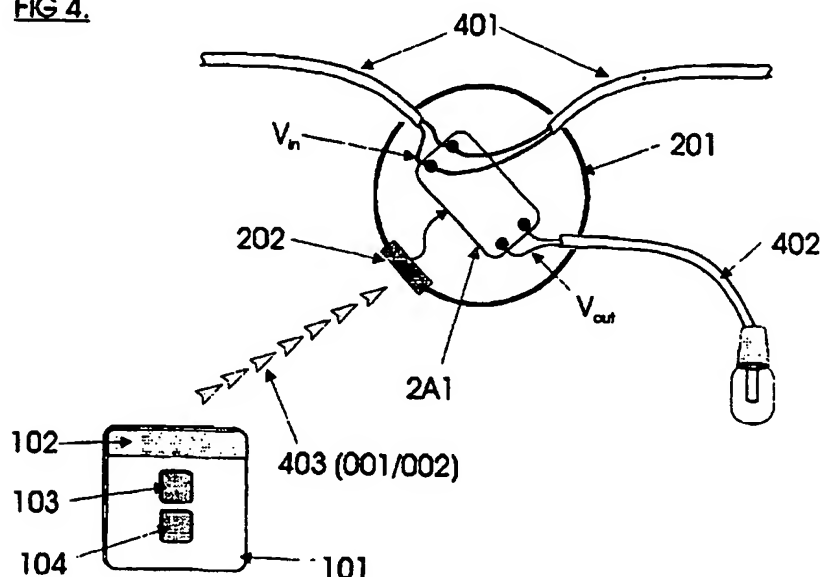
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(58) Field of Search  
UK CL (Edition Q ) G4H HRBE HRBM HRBS HRCE  
HRCM HRCS

(54) Abstract Title  
Wireless (eg infra-red) power control system

(57) A remote control system for general purpose and multifunctional control of an electrical supply, comprising one or more transmitter units 101 in remote communication with, and able to selectively address, one or more receiver-control units 201. The system can be adjusted to control a range of supply voltages. Receiver-control units may be alterably configured to provide selectable control functions in response to receipt of specific codes from a transmitter unit. The system provides a flexible means by which remote control may be introduced where hard-wired control was previously necessary, and is particularly useful for installation whilst rewiring a building as it eliminates the necessity for and damage associated with replacement of old switch wires commonly buried within the fabric of walls.

**FIG 4.**



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Drawings: 1 of 6

FIG. 1

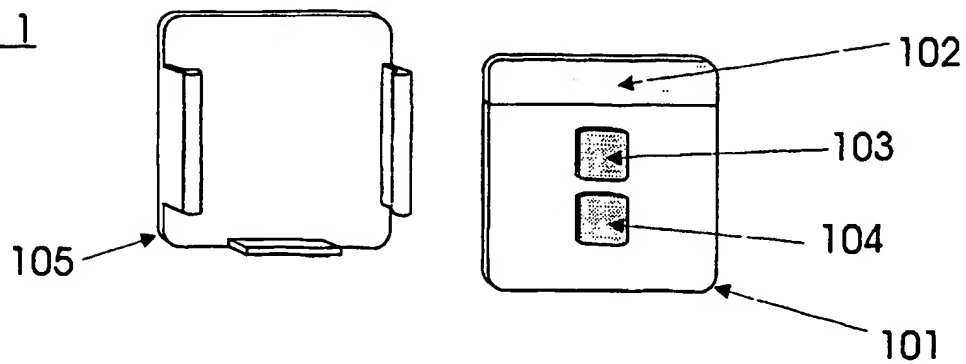


FIG. 1A

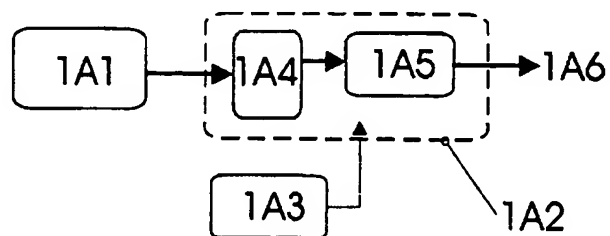


FIG. 2

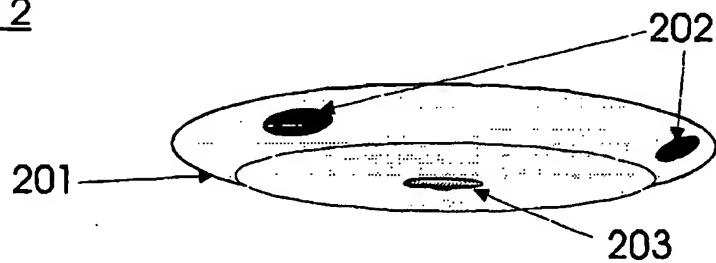


FIG. 2A

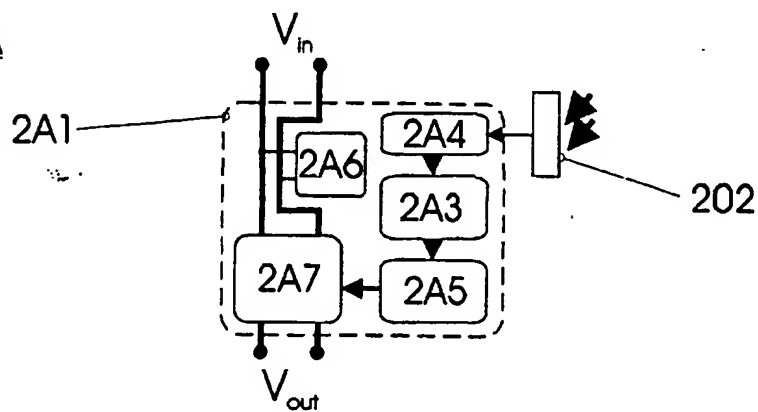


FIG 3.

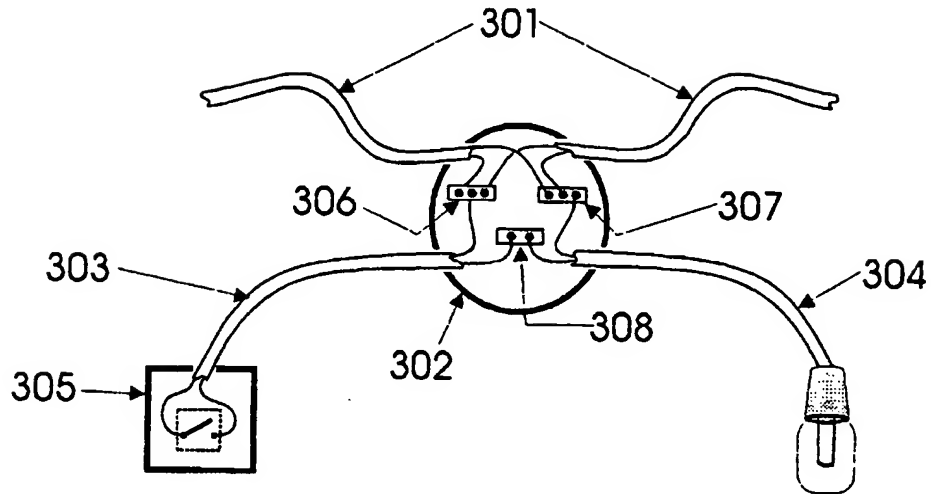


FIG 4.

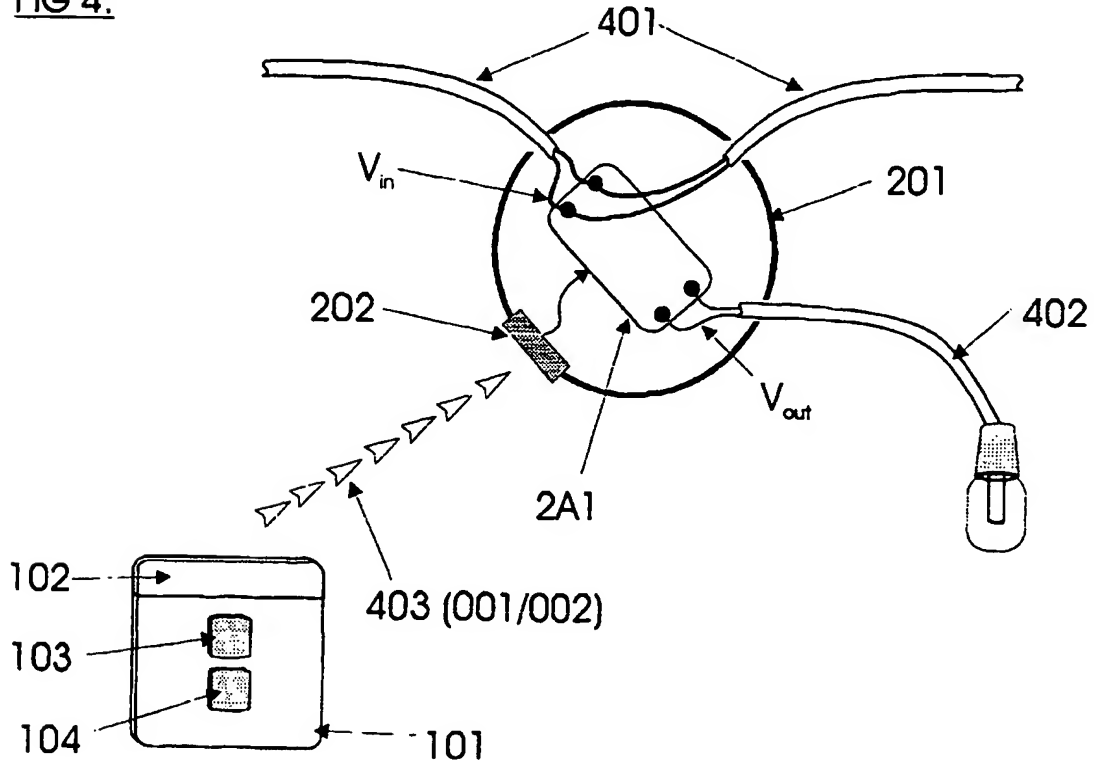


FIG 5.

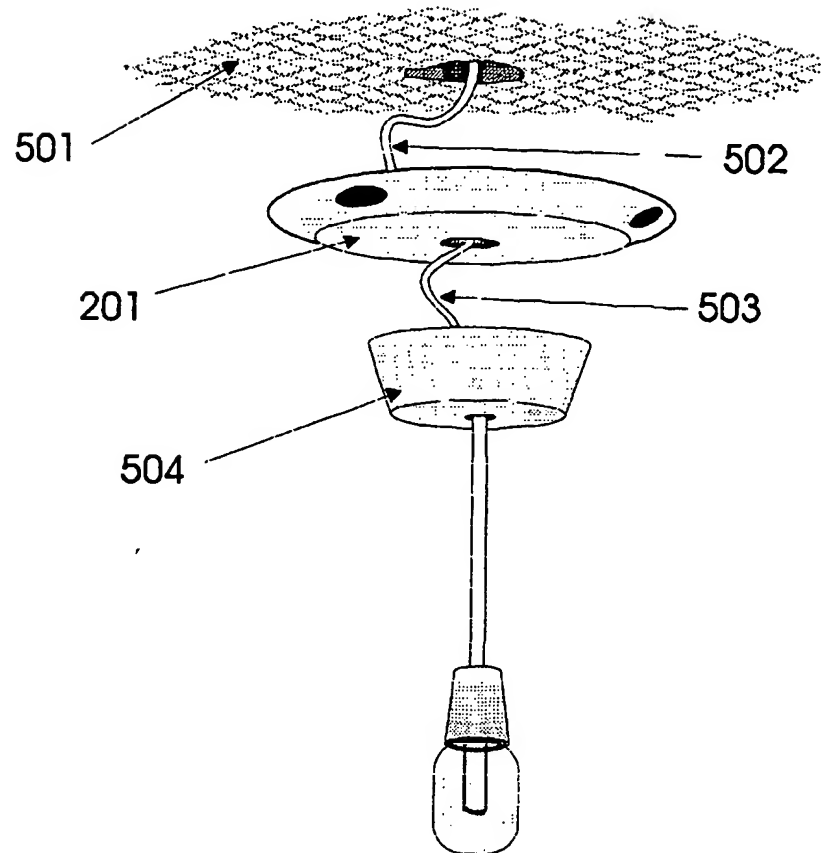


FIG 6.

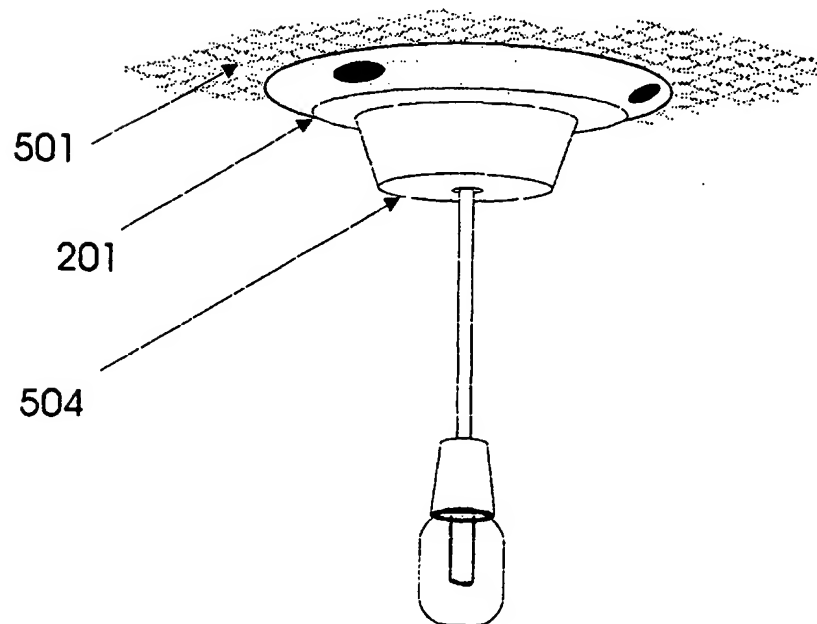


FIG 7.

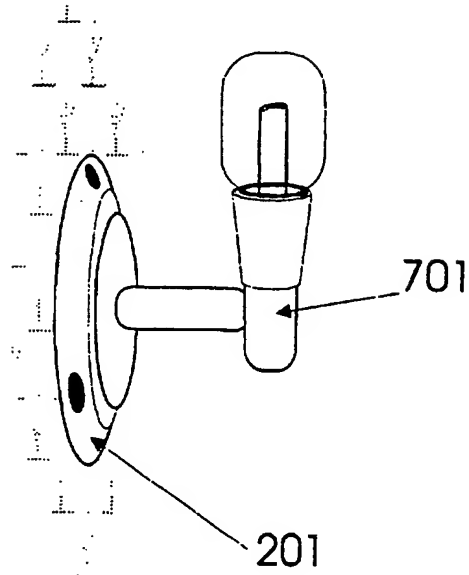


FIG 8.

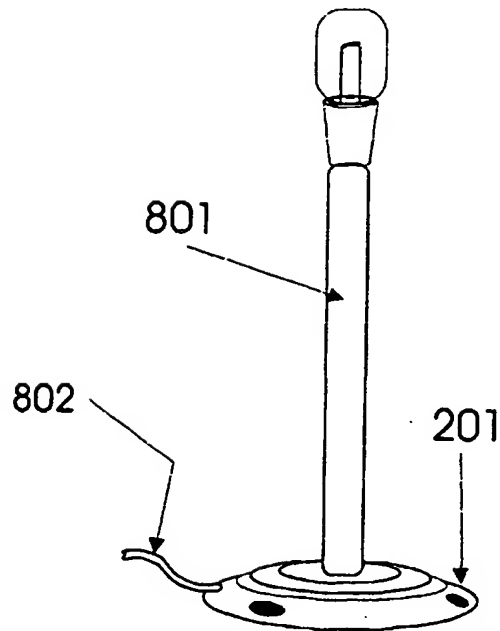


FIG 9.

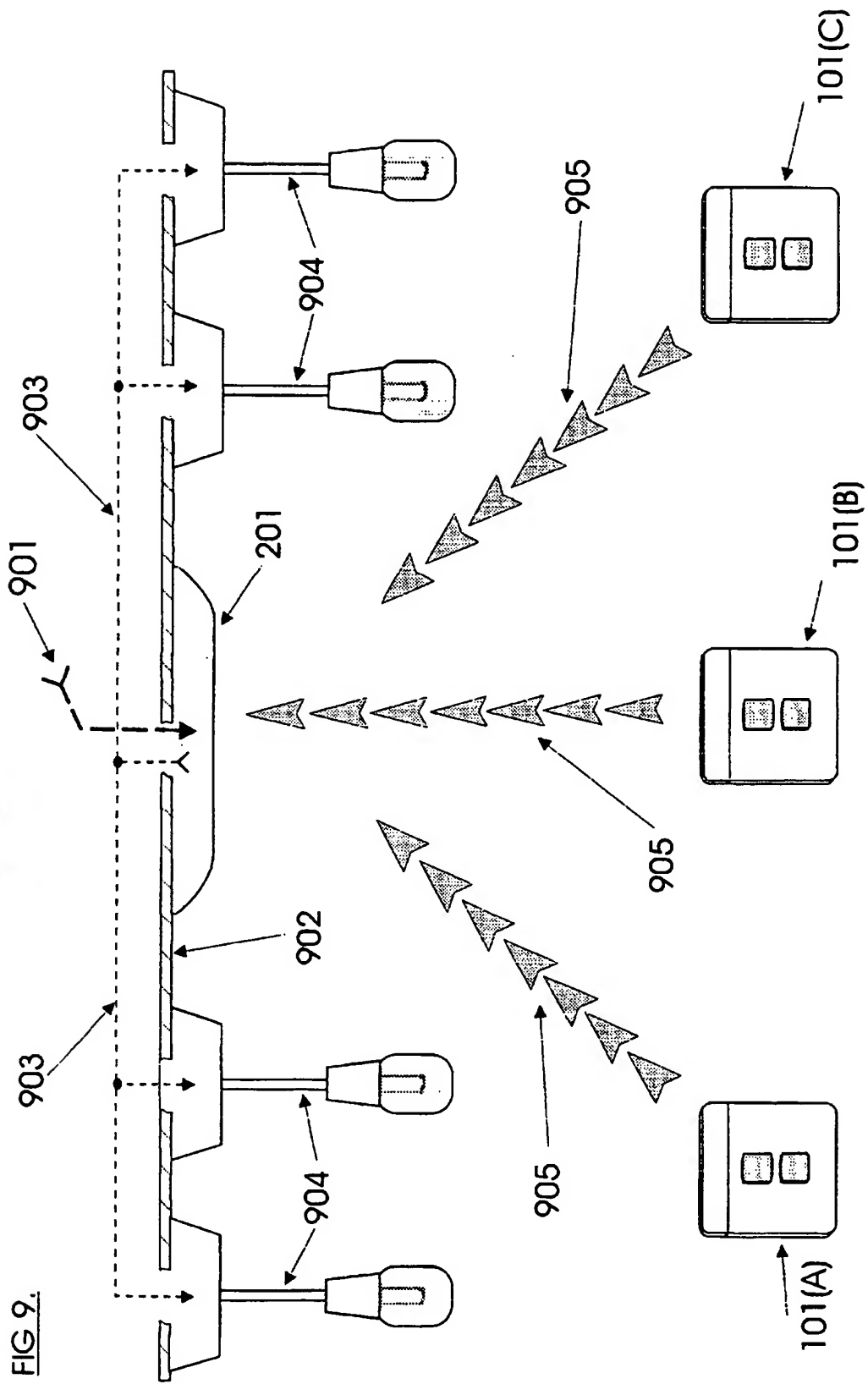
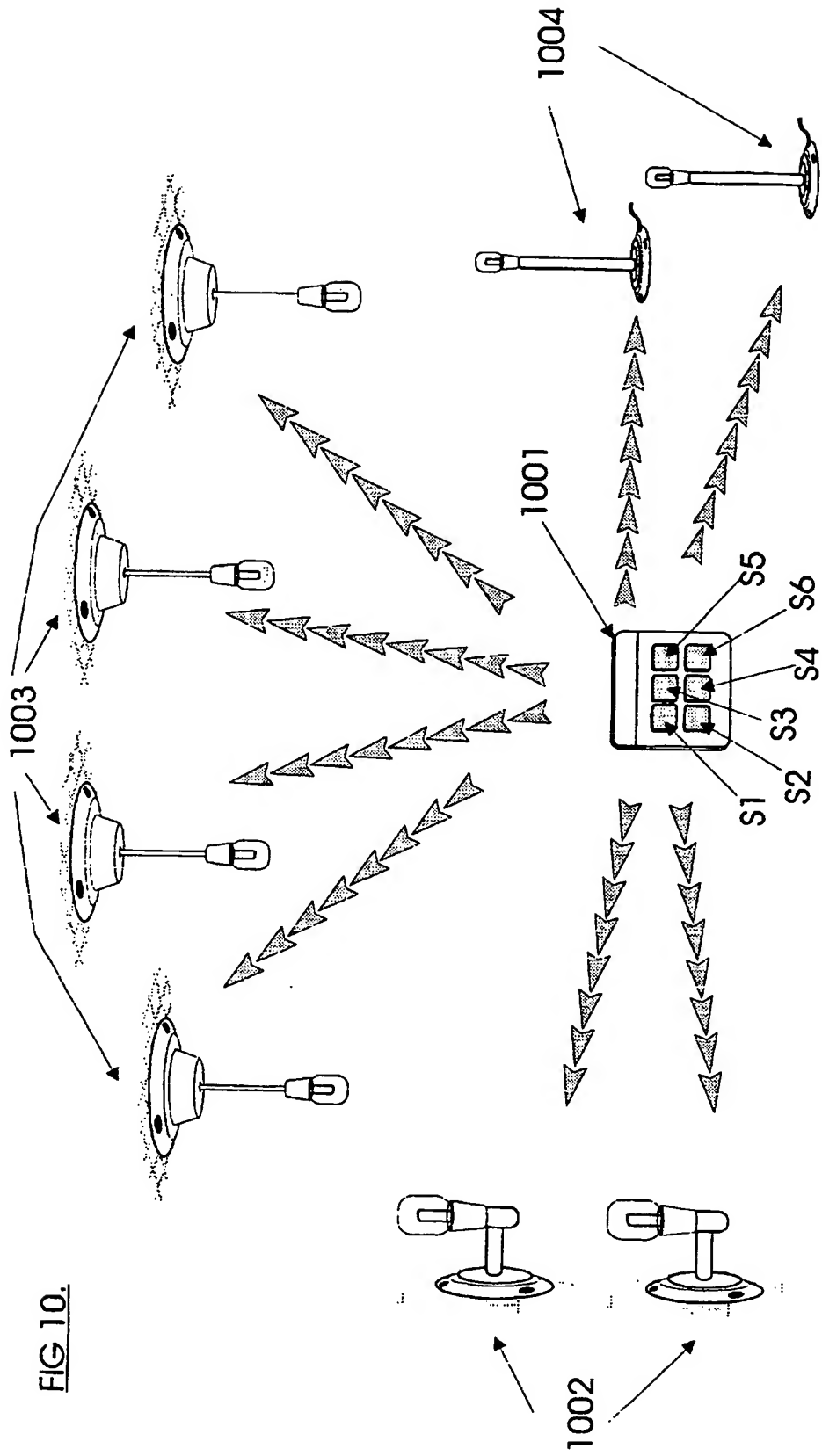


FIG 10.



## WIRELESS POWER CONTROL SYSTEM

### FIELD OF INVENTION

The present invention relates to apparatus for the general control of an electrical supply without the need for switch wires or control cables.

### BACKGROUND TO THE INVENTION

The cost of rewiring a building can be considerable in terms of materials, inconvenience, and time. Because it is generally required that cables be concealed many are secreted under floors, above ceilings, and within the fabric of the walls. A good example of the later would be switch wire cables providing control to various appliances throughout a building. A more specific example would be switch wire cables from a wall mounted switch providing control to a ceiling mounted light fitting. Such a cable is often buried within plaster wall coverings and behind decorative finishes. Should it be necessary to install, move, alter, or replace such a cable, it is often required that a channel be cut into the surface of the wall corresponding with the cable's determined route. This is a messy and invasive procedure that is time consuming, causes damage to the fabric of the wall, and, after installation of cables ultimately requires reinstatement. Repairs to damage of this nature are rarely invisible and usually costly.

In certain situations it may be impractical or impossible to conceal a switch wire or control cable. Circumstances may demand therefore that cables be surface run within a protective conduit. Although effective, this method is unsightly and requires additional fabrication and materials.

Consideration is also given to disabled persons and children who are often unable to reach wall mounted control devices. The procedure to reposition a wall mounted switch is often a costly undertaking. The ability to freely place or subsequently reposition a control point at any height or location without the need for cables would be invaluable.

The mere presence of an mains electrical supply represents a potential hazard. Operation of a conventional mains-fed hard-wired switch places the operator in close proximity to a lethal voltage. Additional consideration is given to



electrical installations in hazardous conditions. For example, it is often undesirable to install switch wires or control cables in close proximity to water because of the increased risk of short-circuit or lethal exposure to electrical power. Waterproof control products are available but still require cable installation, and for an operator to be in physical contact with housings concealing conductors. To achieve control over a high voltage electrical supply from a remote location which is electrically detached and operates using a low voltage transmitter would offer many practical advantages.

Further consideration is given to existing electrical systems that rely on or require hard-wired remote control. An example of such a system exists within many establishments that care for elderly people. Colloquially known as Nurse-Call systems the elderly resident may call for assistance by depressing a button on a hard-wired remote handset. The remote handset is usually attached to a wall-mounted call-point which in turn is hard-wired to a central control panel. When a handset button is activated a voltage change is detected within the system and this occasions an audible alarm to sound indicating assistance is required. Whilst totally wireless systems are available they are costly and do not integrate with more conventional hard-wired systems. A useful upgrade to existing hard-wired systems would be for wireless communication between the handset and a wall-mounted call-point hence providing all the advantages of the wireless system without the full cost of such an installation.

### SUMMARY OF THE INVENTION

Accordingly the present invention provides remote-control apparatus which is as claimed in the appended claims including -

1. a transmitter module contained within a housing capable of being removably mounted or superficially attached to any supporting surface with means to transmit a source of coded radiation, and including a plurality of actuators that may be independently and changeably assigned to control emission of a plurality of individually selectable coded signals for the purpose of communicating with -

2. a multi-functional receiver control unit disposed in the path of an electrical supply with means to selectively discriminate and decode said radiation, and means

to perform a range of selectable control functions on said electrical supply in response to the said radiation, including means for terminating and distributing said electrical supply, and contained within a housing suitable for free-standing or fixture to a supporting surface, and in turn providing support for external fixture.

An object of the present invention is to eliminate the need for and inconvenience associated with the installation, alteration, or addition of electrical switch wire and control cables within a building, by providing a means to remotely control an electrical supply with a system which offers easily installed modules for the handyman and professional alike.

A further object of the present invention is to provide means to control an electrical supply with general-purpose remote-control apparatus that may be incorporated into electrical systems including means to effect a multiplicity of selectable control conditions.

A further object of the present invention is to provide means for wireless remote control on electrical circuits and systems that previously required wired remote control.

A further object of the present invention is to provide a remote control system that may be adjusted to control any input voltage.

A further object of this invention is to provide means by which an electrical supply to a plurality of electrical outlets within a room may be controlled from a single location without the need for switch wires or control cables.

A further object of the present invention is to provide a system where a receiver-control unit may be simultaneously controlled by a plurality of transmitter units .

A further object of the present invention is to provide a system where a transmitter unit may simultaneously control a plurality of receiver-control units that may be individually configured to provide similar or dissimilar control conditions.

A further object of the present invention is that during the process of rewiring a building, existing switch wires or control cables may be discarded but need not be replaced hence minimising damage that may be caused by removal or renewal, therefore reducing the cost and duration of the overall installation.

Yet another object of the present invention is that switching or control of new

circuits or power feeds taken from existing power wiring may be achieved without the need for installing switch wires or control cables.

A further object of the present invention is to provide a transmitter unit within a housing including means for said housing to be removably mounted or superficially attached to any supporting surface.

A further object of the present invention is for the receiver-control unit to include means to derive it's own power source from the electrical power supply that it will control, and that the housing of the receiver-control unit include means to safely terminate and internally conceal all electrical conductors and prevent accidental exposure to electrical power.

Other objects and advantages will become apparent from the following description and appended claims.

#### GENERAL DESCRIPTION OF THE DRAWINGS

To help understanding of the invention, a specific embodiment thereof will now be described by way of example where the chosen radiation will be infrared, and with reference to the accompanying drawings, in which;

FIG. 1 is a perspective view of a preferred embodiment for the surface mountable transmitter housing and support cradle.

FIG. 1A is an electrical block diagram representing the transmitter module components.

FIG. 2 is a perspective view of a receiver control plate showing a preferred embodiment.

FIG. 2A is an electrical block diagram representing the receiver control module components.

FIG. 3 is an illustration of a conventional hard-wired method of controlling electrical supply to a lamp with single-way switching.

FIG. 4 illustrates how a receiver-control unit, in conjunction with a transmitter unit, may be installed to control a circuit similar to that in FIG. 3 without the need for a switch-wire cable.

FIG. 5 is a perspective view indicating the relative position of the receiver-control unit during one method of installation.

FIG. 6 is a perspective view of a receiver-control unit after installation to control a ceiling-mounted electrical fitting.

FIG. 7 is a perspective view of a receiver-control unit after installation to control a wall-mounted electrical fitting.

FIG. 8 is a perspective view of a receiver-control unit after installation to control a free-standing electrical fitting.

FIG. 9 is a diagrammatic illustration of how a single receiver-control unit installed in a remote location can control electrical supply to a plurality of ceiling mounted fittings, whilst itself being controlled by a plurality of transmitter units.

FIG. 10 illustrates how a transmitter unit capable of generating a plurality of coded emissions would be able to simultaneously achieve individual or group control over a multiplicity of receiver-control units.

With reference to FIG.1, the transmitter housing 101 is a hollow enclosure limited in size only by the components it must encase and those it must outwardly support and referred to in FIG. 1A. It is of a design making it suitable to be mounted superficially on any supporting surface, or detachably mounted on a cradle 105 which may be superficially attached to a supporting surface. 102 is a light emitting diode (LED) array. 103 and 104 are push switches with normally open contacts.

FIG. 1A shows an electrical block diagram of the transmitter module 1A2 which is housed within the transmitter housing 101, and associated components where 1A1 represents input data from switches 103 or 104 in FIG. 1, where 1A4 selectively encodes said data, and 1A5 transmits the encoded data 1A6 via the diode array 102 in FIG. 1. The transmitter module is powered by battery 1A3 which is also housed within the transmitter housing 101.

With reference to FIG.2, the receiver-control unit 201 is hollow and disk-like in shape, with a flat upper surface tapering to a smaller diameter lower surface. Within the tapering side are mounted radiation sensing devices 202 for detecting infrared. An optional orifice 203 is provided for in the smaller diameter lower surface through which the output from the plate may be cabled. Further cable orifices are provided for in the flat upper surface. A preferred receiver-control module 2A1 in FIG. 2A is housed within the hollow interior of 201 and operates in conjunction with

the sensors 202. The receiver-control module 2A1 will selectively detect infrared emissions from a transmitter plate as referred to in FIG.1, and upon receipt of a desired code will occasion a change in the electrical state at the output.

FIG. 2A shows an electrical block diagram of the internal workings of receiver-control module 2A1, where receiver 2A4 in conjunction with sensor 202 detects coded radiation, the code recognition selector 2A3 determines which codes to respond to, function selector 2A5 determines what action the controller 2A7 should take. Electrical power to the receiver-control module 2A1 is derived from the power supply unit 2A6 which in turn is supplied from the incoming voltage ( $V_{in}$ ) to the module.

The controller 2A7 in module 2A1 is disposed in series with the incoming electrical supply, and working in conjunction with process selector 2A5 possesses the ability to alter said electrical supply to the output ( $V_{out}$ ). Controller 2A7 possesses the ability to provide a range of control functions which include but are not limited to; switching, voltage control, current control, and introduction of or response to control signals carried in the supply line such as phase angle control.

FIG. 3 illustrates a conventional hard-wired method of controlling power to a lamp 304 using a single-pole switch 305. Electrical power is supplied by incoming ring-main 301, positive conductors are terminated by connector block 306, and negative conductors are terminated by connector block 307. A remote switch 305 is placed in series between connector blocks 306 and 308 via switch-wire cable 303. When switch 305 is closed a circuit is made and lamp 304 is energised. 302 represents a junction box, or ceiling-rose body.

FIG.4 shows how control of power in an example similar to that shown in FIG.3 may be achieved by using a receiver-control unit 201 and transmitter unit 101. Positive and negative power conductors from the incoming ring-main 401 are connected to their respective terminals on the receiver-control module 2A1 within the receiver-control unit 201. For the purpose of this example the units function as follows; Depression of switch 103 causes the transmitter unit 101 to transmit radiation 403 containing the code 001. Depression of switch 104 causes the transmitter unit 101 to transmit radiation 403 containing the code 002. The receiver-control module 2A1 is configured to recognise radiation 403 containing the codes

001 and 002. Upon receipt of the designated radiation 403 from the transmitter unit 101 the receiver-control module 2A1, whose control function for the purposes of this example will be to act as a latching series switch, will make or break the power supply to the lamp 402 where code 001 signifies power on, and code 002 signifies power off.

A further example for FIG. 4 will be where the control function of module 2A1 is configured to increase or decrease the output power incrementally, where code 001 signifies an increase and code 002 signifies a decrease. Given this control setting module 2A1 would function as a dimmer.

FIG. 5 is a perspective illustration to establish the position during installation of a receiver-control unit 201 for control of a ceiling mounted light fitting, where 501 is the ceiling, 502 is the unswitched electrical power supply cable emerging from above the ceiling and feeding into 201, and 503 is the output cable from 201 connecting into 504 which represents a light fitting assembly.

FIG. 6 is a perspective illustration of the likely appearance of a receiver-control unit 201 after installation to control a ceiling mounted light fitting 504. Unit 201 has been conveniently secured to the ceiling 501. Light fitting 504 is positioned over and conveniently secured through receiver-control unit 201 into ceiling 501.

FIG. 7 is a perspective illustration of a receiver-control unit 201 installed to control a light fitting 701 mounted on a vertical supporting surface, where the light fitting is conveniently secured through the receiver-control unit into the supporting surface.

FIG. 8 is a perspective illustration of a receiver-control unit 201 adapted to control a free-standing lamp 801. The receiver-control unit 201 is provided it's electrical supply via incoming flex 802, and is conveniently secured to the base of the lamp 801.

FIG. 9 illustrates a plurality of transmitter units governing an individual receiver-control unit, which in turn is controlling the electrical supply to a plurality of light fittings. In this example three transmitter units 101(A), 101(B), and 101(C) are configured identically. The receiver-control unit 201 is mounted on a supporting surface 902 and configured to respond to emissions from the said transmitter units, therefore control over the incoming electrical supply 901 can be achieved by any

of the said transmitter units. Output 903 from the receiver-control unit 201 has been fed to several remotely-located light fittings.

FIG. 10 pictorially demonstrates how a transmitter unit 1001 possessing the means to radiate a plurality of coded emissions is capable of selectively commanding individual receiver-control units. In this example the receiver-control units 201 are configured in groups. Group 1002 represents two wall-mounted units each configured to switch on and off in response to codes 001 and 002 respectively. Group 1003 represents four ceiling-mounted units each configured to act as dimmers by an increase and decrease in output voltage in response to codes 003 and 004 respectively. Group 1004 represents two free-standing units each with a similar configuration to that of group 1002 but in response to codes 005 and 006. Transmitter plate 1001 is similar to the unit described in FIG. 1 except it is equipped with six push-switches with normally-open contacts. Each switch causes the transmitter to emit a particular code, where S1 = code 001, S2 = code 002, S3 = code 003, S4 = code 004, S5 = code 005, and S6 = code 006. Accordingly, control over the various groups can be achieved on a selective basis.

The invention is not intended to be restricted to the details of any of the above described embodiments.

**Claims:**

**1. A wireless power control system for controlling the supply of electrical power to a load from a remote location, comprising -**

- one or more low-voltage transmitter units containing apparatus with means to transmit a source of coded radiation for the purpose of remote control and communicating with -
- one or more receiver-control units, physically separate from said transmitter units, containing apparatus with means to perform control functions on an electrical supply to a load in response to said radiation.

**2. A transmitter unit as claimed in claim 1, comprising a hollow housing embodying -**

- apparatus with means to transmit a plurality of selectable coded emissions in reaction to operation of -
- a preferred plurality of assignable actuators, including means for said actuators to be individually configured and assigned to occasion transmission of selected codes.

**3. A transmitter unit as claimed in any preceding claim, including convenient means by which configuration and assignment of said actuators may be altered.**

**4. A transmitter unit as claimed in any preceding claim, that may be superficially attached to any supporting surface.**

**5. A transmitter unit as claimed in any preceding claim, that may be detachably mounted on a supporting device which may be superficially attached to any supporting surface, facilitating optional portable application.**

**6. A receiver-control unit as claimed in claim 1, comprising a hollow housing embodying apparatus adapted for and disposed in the path of an electrical supply, with means to -**

- detect and decode incoming coded control signals, and



- perform a plurality of selectable control functions upon said electrical supply in response to specific incoming codes, where recognition of specific codes and determined control function may be independently and alterably selected.

7. A receiver-control unit as claimed in any preceding claim, that may be superficially attached to a supporting surface.

8. A receiver-control unit as claimed in any preceding claim, that may be installed between an electrical appliance to which it will control the supply of electrical power, and the supporting surface upon which the appliance would ordinarily be fixed.

9. A receiver-control unit as claimed in any preceding claim, adapted for and including means to be attached to a free-standing appliance.

10. A receiver-control unit as claimed in any preceding claim, that may stand on a supporting surface.

11. A receiver-control unit as claimed in any preceding claim, adapted for and including means to be installed within the length of a flexible cable.

12. A receiver-control unit as claimed in any preceding claim, offering support for, and from which, an electrical fitting or appliance may be suspended.

13. A receiver-control unit as claimed in any preceding claim, including means to route cables through external surfaces and safely terminate and internally conceal all electrical conductors.

14. A receiver-control unit as claimed in any preceding claim, that may be adapted to control any supply voltage.

15. A receiver-control unit as claimed in any preceding claim, including means to derive it's own power supply from the power supply that it controls.

16. A receiver-control unit as claimed in any preceding claim, including means to render a plurality of controlled electrical output conditions to a plurality of outputs.

17. A receiver-control unit as claimed in any preceding claim, including means to introduce control signals to an electrical supply.



Application No: GB 9828804.6  
Claims searched: 1-17

Examiner: Mike Davis  
Date of search: 5 February 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): G4H (HRBE, HRBM, HRBS, HRCE, HRCM, HRCS)

Int Cl (Ed.6):

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
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X	GB 2320119 A (HENDERSON)	1-17
X	GB 2308910 A (REGAN ET AL)	1-17
X	GB 2300943 A (BATTLE)	1-17
X	GB 2294569 A (FLECON...)	1-17
X	GB 2292626 A (COLEMAN ET AL)	1-17
X	GB 2280291 A (WEINER ET AL)	1-17
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X	WO 97/24908 A1 (REGAN ET AL)	1-17

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